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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
DOLAN, JENNIFER M	
ART UNIT	**PAPER NUMBER**
2813	

DATE MAILED: 04/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/895,478	HARNDEN ET AL.	
	Examiner	Art Unit	
	Jennifer M. Dolan	2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 April 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2 and 4-12* is/are pending in the application.

4a) Of the above claim(s) *8-12* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2 and 4-7* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 4/11/05 has been entered.

Election/Restrictions

2. Claims 8-12 have been withdrawn from further consideration as being drawn to a nonelected invention. Election was made **without** traverse in the reply filed on 6/7/02.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 2, 4, and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese Patent Publication No. 59-161851 to Yoshida in view of Japanese Patent Publication No. 62-117355 to Komatsu et al.

Regarding claim 1, Yoshida discloses a small footprint device package comprising: a plastic package body (4) for enclosing a die (2, 3'), the package including a top, bottom, and sides (see figures 1-5); a diepad supporting the die (page 3, paragraph 3), the diepad having a first side and a second side (top and bottom); a first lead (right side lead 5; figure 5) in electrical and thermal communication with the die (see figure 5), and a second lead (5 on the left side) wirebonded to the die (see figure 5), the first and second leads including an enclosed portion and an exposed portion extending from the side of the package and folding underneath the package bottom to form a first lead foot having a reverse gull wing shape (figure 5b), wherein the angle between the lead on the side of the package and the lead foot is less than 90 degrees (see figure 5; Application Example 4 on pages 4-5), the lead foot being inclined at an angle relative to a planar PC board (8; see figure 5). Yoshida further discloses that the first side of the die is in contact with the diepad on a side opposite to the first and second lead feet, wherein a first end of the bondwire is in contact with a side of the enclosed lead portion opposite to the first and second lead feet, and a second end of the bondwire is in contact with a second side of the die opposite to the first and second lead feet.

Yoshida does not, however, disclose that the diepad or lead structure could be flipped, such that the die is in contact with the side of the diepad proximate to the lead feet, and wherein the bond wire is in contact with the lead and the die on the side proximate to the first and second lead feet.

Komatsu teaches that the lead feet of the package can be alternately bent in either direction relative to the die (see figures 1a, 1b; 'PURPOSE'), such that the die may alternately contact the portion of the leadframe proximate to the lead feet (7; as in figure 1b), with the

bondwire contacting the lead portion and die proximate to the lead feet (figure 1b), or opposite to the lead feet (figure 1a; also comparable to the structure of Yoshida, supra).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the die and bondwire position of the package of Yoshida, such that the contacts are proximate the lead feet, rather than being placed on the opposite side of the lead frame, as suggested by Komatsu. The rationale is as follows: A person having ordinary skill in the art would have been motivated to place the die and bond wire contacts on the sides proximate the lead feet, because Komatsu shows that the lead end can be bent in either direction relative to the diepad/die structure (Komatsu, figures 1a, 1b), and that structures disposed on the leadframe opposite to the lead feet (Komatsu, figure 1a) and proximate to the lead feet (Komatsu, figure 1b) are art equivalents that may be alternately used (see Komatsu, 'PURPOSE). Additionally, Komatsu shows that it is advantageous to form chip packages wherein the contact surfaces of the die and bondwire are provided on the side of the leadframe proximate to the lead feet (as in figure 1b of Komatsu) in order to facilitate matching between terminals of adjacently stacked or coupled chips (see Komatsu, 'CONSTITUTION').

Regarding claim 2, Yoshida discloses that the die is an integrated circuit (Page 2, prior art section) or a discrete device (page 5, Industrial application section).

Regarding claim 4, Yoshida discloses that the package has a reduced profile (figure 5).

Regarding claim 6, Yoshida discloses that the package body further comprises a notch (6b) configured to receive a portion of the first lead foot (figure 5).

5. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshida in view of Komatsu et al. as applied to claim 1 above, and further in view of U.S. Patent No. 6,114,759 to Okuaki.

Yoshida discloses a package wherein the lead foot is inclined at a small angle relative to the planar PC board (figure 5), but fails to specify the angle or provide a motivation for inclining the lead foot.

Okuaki discloses a small angle inclination of the lead foot relative to the planar PC board (figures 3 and 5) in order to promote solder wetting and maintain a high bond strength (column 3, lines 12-21). The angle is considered to be about 1-7 degrees (see figures 3 and 5), but Okuaki is silent as to the exact angle.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to specify in Yoshida as modified by Komatsu an angle of inclination between the lead foot and the PC board of 1 – 7 degrees. The rationale is as follows: One of ordinary skill in the art at the time the invention was made would have been motivated to incline the lead foot at an angle between 1 and 7 degrees relative to the PC board, because slightly bending the free end of an outer lead away from the PC board promotes solder wetting (Okuaki, column 3, lines 12-21), but bending the free end at a large angle decreases the contact area between the leads and the PC board, which can decrease the bond strength and cause an increase in the total package height. It is well within the purview of a person having ordinary skill in the art to select an angle between 1 and 7 degrees to optimize the solder wetting, bond strength, and package height. Although Okuaki fails to specify the exact angle of inclination of the lead foot, it has been held that "where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the

optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (1955).

6. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshida et al. in view of Komatsu et al. as applied to claim 6 above, and further in view of U.S. Patent No. 6,433,418 to Fujisawa et al.

Yoshida fails to disclose that the notch includes a depth of about two thirds of the thickness of the lead.

Fujisawa discloses a notch (28a) that includes a depth of about two-thirds of the thickness of the lead (figures 8 and 9). Fujisawa is, however, silent as to the exact depth of the notch.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the notch of Yoshida as modified by Komatsu, so that the depth is about two-thirds of the thickness of the lead, as suggested by Fujisawa. The rationale is as follows: One of ordinary skill in the art at the time the invention was made would have been motivated to provide a notch with a depth as specified, so that the device can be easily stacked, yet maintain a small profile (Fujisawa, figures 12 and 13). Additionally, the notch depth should be selected to provide the advantages of preventing damage to the leads during assembly or mounting, in the form of short circuiting or deformation (Fujisawa, column 8, line 64 – column 9, line 17), while preventing the lead from retracting entirely into the protective notch during assembly. Although Fujisawa fails to specify the exact depth of the notch, it has been held that "where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or

workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (1955).

Response to Arguments

7. Applicant's arguments with respect to claims 1, 2, and 4-7 have been considered but are moot in view of the new grounds of rejection.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent No. 5,508,557 to Sunada discloses an unpreferred embodiment including a die and bondwire disposed on the underside portion of a lead frame, proximate to the lead feet (see figure 6).

U.S. Patent No. 6,175,149 to Akram discloses a multi-chip package including a leadframe having lead feet bending under the package and a die-bondwire structure provided on the side of the leadframe proximate the lead feet (see figure 5 and 6).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer M. Dolan whose telephone number is (571) 272-1690. The examiner can normally be reached on Monday-Friday 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl W. Whitehead, Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jennifer M. Dolan
Examiner
Art Unit 2813

jmd